LESSONS LEARNED FROM AVIAN INFLUENZA OUTBREAKS IN VIRGINIA 1983 AND 2002

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Early developments in commercial hatchery technology, artificial incubation and brooding, marketing, diagnostic testing, and key infrastructure improvements from 1900 to 1950 contributed to the growth and present prominence of the poultry industry in the Shenandoah Valley and its importance in the agricultural economy of Virginia. In 2003, Virginia ranked 5th, 9th, and 31st in the nation for commercial turkey, broiler, and egg production, respectively, and the value of the state's turkey, broiler, and egg production was $692 million. The expansion and density of poultry production in the Shenandoah Valley has posed challenges to the industry and regulatory officials in the control of contagious diseases like avian influenza (AI).

The low pathogenic avian influenza outbreaks of 1983 and 2002 were particularly challenging and problematic because of the magnitude and urgency of the epidemic and carcass disposal issues. Many lessons were learned from these outbreaks and the experience of trying to dispose of poultry carcasses through on-site burial, burial in a sanitary landfills, incineration, rendering, and Ag-Bag composting. Each outbreak was unique and offered many environmental and economic challenges. Virginia regulatory officials, as a result of these experiences, have encouraged the poultry industry to consider sanitary landfills and in-house or on-farm composting as rapid response tools of disposal and disease containment, particularly with low pathogenic avian diseases.

COST TO INDUSTRY

In 1983 an avian influenza outbreak cost Virginia poultry farmers and industry $40 million, resulting in the disposal of 5,700 tons of poultry carcass material. Approximately 88% of the material was disposed of on-site in burial trenches, and the remaining 655 tons of carcass were disposed of in a local sanitary landfill (McClaskey, 2004). The cost of on-site burial and landfill was $25 per ton or $142,000. Concerns about contaminated groundwater from these sites and the discovery, during the excavation of a school building site in the late 1990s, of relatively intact poultry carcasses buried for more than 15 years affected future decisions and responses.

Eighteen years later the poultry industry in the central Shenandoah Valley was affected by an even larger avian influenza outbreak, costing the industry an estimated $130 million. At the time of the outbreak in 2002, more than 56 million commercial turkeys and chickens were being grown on over 1,000 poultry farms. On March 12 low pathogenic avian influenza was confirmed in a turkey breeder flock near Penn Laird, Virginia. One month later more than 60 flocks tested positive. A total of 197 farms were infected, and 4.7 million birds were destroyed to eradicate the virus. Turkeys accounted for 78% of the positive farms and bird losses (DEQ, 2002).

CHANGES IN THE ACCEPTANCE OF DISPOSAL METHODS

On-site burial, assumed to be an acceptable method of disposal based on its use in 1983, was used to dispose of the first flock in 2002. However, several complaints about on-site burial and possible well contamination were raised by adjoining landowners. Today there is greater public awareness of the need to protect groundwater resources. In response to these concerns, state authorities have developed stricter criteria for on-site burial, such as public disclosure of sites on deed records, use of a compacted clay liner, a narrower ratio of birds to carbon material, and on-site groundwater monitoring.

EXPERIENCE AND RESEARCH WITH DIFFERENT DISPOSAL METHODS IN 2002

As the disease progressed in 2002, many alternative disposal methods were researched, and 5 options were implemented: burial in sanitary landfills, controlled slaughter, incineration with air curtain destructors, in-house and Ag-Bag composting. Rendering was not used as a disposal method because of biosecurity risks associated with central collection sites and possible disease transmission.

Approximately 13,100 tons of infected poultry were landfilled. Two large landfills located more than 160 miles from Harrisonburg accepted 7,900 tons, but transportation was expensive and problematic because of distance and an insufficient number of biosecure dump trailers (Senne, Holt, and Akey, 2004). Tipping fees for landfilling the carcasses ranged from $45 to $89 per ton. With euthanasia, truck loading, and tipping fees, the actual disposal cost was $145 per ton. In 2004 a long-term contract was negotiated with 2 mega-landfills to accept carcasses at a cost of $75 per ton.

Table 1. Disposal Methods for Avian Influenza Infected Poultry and Quantity Disposed of by Method in 2002

Method of Disposal	Number of Birds	Percent of Total
Composting (Ag-Bag & In-house)	43,000	0.9
Incineration	641,000	13.4
Landfilling	3,103,000	65.5
Controlled slaughter	943,000	19.9
On-site burial	15,000	0.3
Total	**4,732,000**	**100.0**

LANDFILLING

Landfilling was successfully used to dispose of 65% of avian influenza infected birds in 2002. Large commercial sanitary landfills may continue to be an effective disposal method with proper biosecurity, supervision, and coordination with industry and state authorities. However, disposal at smaller county or regional landfills poses many logistical difficulties and is not recommended in most cases. Successful landfill disposal requires significant resources and capital: track-hoe or similar heavy equipment, adequate lighting for operating after normal working hours, cleaning and disinfecting crews and equipment, double lining of transport vehicles to assist in the offloading of carcasses, stabilizing material for working in wet conditions, and an adequate

communications system between the affected farm and the landfill. In addition, transport trucks need hydraulics "wet lines" to operate dump trailers. Disposal of a significant number of animal carcasses in a landfill can result in settling, offensive odors, and increased leachate production. Safety concerns need to be adequately addressed during the offloading of transport trailers.

Poultry litter is usually considered an asset and is used as a soil amendment. From an infected farm, however, litter and feed need to be disposed of after the carcasses are removed from the houses. In 2002 over 5,000 tons needed a $10/ton USDA incentive paid to recipients of this material because of the "stigma" of coming from an AI infected farm.

CONTROLLED PROCESSING

Transporting birds with low-pathogenic AI to processing plants poses a biosecurity threat difficult to manage. Allowing birds to remain on the farm until processing increases the possibility of virus mutation. The potential impact on export and domestic markets needs to be addressed. Communication, biosecurity, and pre-planning are critical for large-scale controlled processing.

INCINERATION

Although it has been used to manage large animal mortalities, prior to 2002, large scale incineration of poultry mortality had not been attempted. Over 600,000 birds were incinerated in air curtain incinerators in the summer of 2002. Critical issues for successfully managing large scale incineration include location and environmental impact, quality and quantity of incinerator feedstocks, scheduling, proper loading of the incinerator, and ash disposal.

ON-SITE BURIAL

Two flocks were buried during the first week of the 2002 outbreak. As mentioned earlier, the public is more aware of and concerned about environmental issues than people were in the 1983-84 outbreak. Similarly, solid waste permitting regulations have been updated, making this disposal method more environmentally sound but more costly and difficult to implement on a large scale.

AG-BAG COMPOSTING

During the search for alternative disposal methods in 2002, Ag-Bag composting was attempted on two flocks and evaluated. As with incineration, this method had not been tried previously for large scale disposal of poultry mortalities. Challenges of Ag-Bag composting include obtaining permits to transport large specialized equipment; moving and disinfecting this equipment; coordinating necessary equipment, supplies and personnel; managing moisture content; and adequately blending the feedstocks. Many

poultry farms in the Shenandoah Valley do not have level ground required for Ag-Bag composting and adequate space outside of the houses to place the Ag-Bags.

Centralized sites for Ag-Bag composting were evaluated during the 2002 AI outbreak, but biosecurity risks and the concerns of neighboring poultry farms prevented these sites from being used.

IN-HOUSE COMPOSTING

In-house composting was attempted on two flocks in the midst of the 2002 AI outbreak with limited supervision and success. Lessons learned include the need for properly constructing and managing the windrows, covering the carcasses with adequate carbon material, having adequate carbon material readily available, coordinating euthanasia protocol, conducting further research and demonstration with various bird types and poultry house designs, and training of farmers and poultry company personnel.

In-house composting had not been considered a viable option by the poultry industry and farmers because of the 2002 experience, the potential loss of production space and the perception that composting would not work on larger birds. However, successful in-house composting of 5-pound broilers on the Delmarva Peninsula in 2004 proved the effectiveness of composting as a method of disposal and containment for an AI outbreak (Malone, 2004a; Malone et al., 2004b). Avian influenza was confined to 3 farms despite the high density of poultry farms in the area. In-house composting appears to be the most acceptable and practical method of disposal because it limits the risks of groundwater and air pollution, potential for farm-to-farm disease transmission, transportation costs, and tipping fees (Tablante et al., 2002).

CARCASS DISPOSAL FOR FUTURE OUTBREAKS

In the 19 years between the 1983 and 2002 AI outbreaks, there was a significant shift in accepted environmental practices which made the preferred disposal method used in the 1983 outbreak unacceptable in 2002. Since the 2002 outbreak, the poultry industry has worked to develop a thorough plan for prevention and rapid response to future challenges and meets regularly to ensure that the plan is current. In the fall of 2004, Virginia Cooperative Extension, Virginia Department of Agriculture and Consumer Services, Virginia Department of Environmental Quality, Virginia Poultry Federation, Virginia Poultry Disease Task Force and the poultry industry initiated a research and demonstration project to evaluate the effectiveness of in-house composting of turkeys as a means of disease containment and disposal of catastrophic losses. This research and demonstration project showed that even large birds, such as 40-pound turkeys, can be effectively composted within 3 to 4 weeks.

Presently, we are researching and demonstrating in-house composting in poultry houses that are not clear span buildings, such as breeder and double-deck houses, which have previously been considered impractical for in-house composting. The goal of this

research is to demonstrate that in-house composting can be used on the majority of U.S. commercial poultry operations.

The avian influenza outbreaks of 1983 and 2002 were particularly challenging and problematic because of the magnitude and urgency of the epidemic and carcass disposal issues. Our experience indicates that off-farm carcass disposal methods introduce additional economic, environmental, and social challenges. On-farm disposal methods such as in-house composting minimize these challenges and offer the poultry industry a biosecure and cost-effective option for disease containment and carcass disposal.

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